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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/872,456	05/31/2001	Clifford N. Click	SUNMP017	3015

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EXAMINER

KENDALL, CHUCK O

ART UNIT PAPER NUMBER

2122

DATE MAILED: 09/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/872,456

Applicant(s)

CLICK ET AL.

Examiner

Chuck Kendall

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
~~Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).~~
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) *
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This action is in response to the application filed ^{8/26/04} ~~01/5/04~~. ^{W.3.}
2. Claims 1 – 20 have been examined.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1 – 3, 7 – 13, 16 – 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Geva USPN 6,539,541 B1 art of record in view of Adl-Tabatabai USPN 6,170,083 B1 art made of record.

Regarding claim 1, Geva discloses a method (FIG. 5), system (FIG. 1) for loop optimization within a dynamic compiler system comprising:

executing code of a computer program having a loop structure, wherein the loop structure includes a loop exit test to be performed during each loop iteration and counting a number of times each of the code is executed (8:1 – 20, see 10: 10 – 15, for loop exit test during each iteration, see counted loop);

compiling the loop structure during the execution of the computer program (4:15 – 29) based on the loop structure being often used (1: 33 – 35, see compile time constant, and also refer to 1:58 – 64, for large compile time constants which Examiner interprets as, the *loop structure being often used*); and

creating an unrolled loop structure during the compiling operation, the creating of the unrolled loop structure being initiated by code that are often used, as identified by the number of

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times each of the code is executed, and (8:35 – 40, see “Unrolling the loop makes several iterations explicitly available to the compiler...”, wherein the unrolled loop structure includes plurality of loop bodies based on the loop structure (See FIG.4B for plurality of loop bodies, see Body (i), Body (I +1), and Body (I +2)). Geva doesn't expressly disclose executing interpreted byte code or counting the number of times each interpreted byte code is executed as well as unrolled loop structure being initiated by interpreted byte code however, Geva does mention in Column 4, 60 – 65, that his disclosure is not limited to any particular language and could be implemented in a compiled or interpreted language. Adl-Tabatabai discloses in an analogous art a Java Virtual Machine using an interpreter to interpret the byte code 3: 20 –25, as well as disclosing determining the number of times (counts) the instructions is executed in the loop see 6: 10-15, further stating that techniques such as loop unrolling etc. can be used during the process see in same column lines 30 –35. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Geva and Adl-Tabatabai because implementing the system using byte codes would make the system platform independent (Adl-Tabatabai, 1: 25 – 31).

Regarding claim 2, a method as recited in claim 1, wherein the unrolled loop structure includes the loop exit test (8:13).

Regarding claim 3, a method as recited in claim 2, wherein the loop exit test is performed once for each iteration of the plurality of loop bodies (8:1 – 10, see code).

Regarding claim 7, a method as recited in claim further including the operation of performing clean up (3:7).

Regarding claim 8, a method as in claim 7 wherein the loop clean-up includes optimizing multiple fall-in loop structures (3:1 – 10, see code structure).

Regarding claim 9, a method as recited in claim 7 wherein the loop clean-up includes optimizing nested loop structures having invariant structures (3:1 – 10, see code structure, 4:5 – 10 for loop invariant).

Regarding claim 10, Geva discloses a dynamic compiling system, comprising:
an interpreter capable of codes of a computer program during execution of the computer program (4:65), the interpreter being further capable of requesting that a particular byte code be

compiled (4:35 – 40) wherein the particular code is compiled based on a count of the number of times the particular code is executed; and

a compiler capable of compiling the code, wherein the compiler is further capable of creating an unrolled loop structure when compiling an original loop structure of the computer program, wherein the unrolled loop structure includes a plurality of loop bodies based on the original loop structure (8:1 – 50). Geva doesn't expressly disclose executing interpreted byte code or counting the number of times each interpreted byte code is executed as well as unrolled loop structure being initiated by interpreted byte code however, Geva does mention in Column 4, 60 – 65, that his disclosure is not limited to any particular language and could be implemented in a compiled or interpreted language. Adl-Tabatabai discloses in an analogous art a Java Virtual Machine using an interpreter to interpret the byte code 3: 20 – 25, as well as disclosing determining the number of times (counts) the instructions is executed in the loop see 6: 10-15, further stating that techniques such as loop unrolling etc. can be used during the process see in same column lines 30 – 35. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Geva and Adl-Tabatabai because implementing the system using byte codes would make the system platform independent (Adl-Tabatabai, 1: 25 – 31).

Regarding claim 11, the system version of claim 2, see rationale as previously discussed above.

Regarding claim 12, the system version of claim 3, see rationale as previously discussed above.

Regarding claim 13, the system version of claim 4, see rationale as previously discussed above.

Regarding claim 16, the computer program version of claim 1, see rationale as previously discussed above.

Regarding claim 17, the computer program version of claim 2, see rationale as previously discussed above.

Regarding claim 18, the computer program version of claim 7, see rationale as previously discussed above.

Regarding claim 19, the computer program version of claim 8, see rationale as previously discussed above.

Regarding claim 20, the computer program version of claim 9, see rationale as previously discussed above.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 4 – 6, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable Geva USPN 6,539,541 B1 art of record in view of Adl-Tabatabai USPN 6,170,083 B1 art being made of record as applied in claim 1, in view of Srivastava USPN 5,457,799 art of record.

Regarding claims 4, Geva and Adl-Tabatabai discloses all the claimed limitations as applied in claim 1 above. The combination of Adl-Tabatabai and Geva doesn't explicitly disclose building a loop tree based on loops included in the computer program. However, Srivastava does disclose this limitation (4:7 – 15). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Geva and Adl-Tabatabai and Srivastava, because using loop regions in the form of trees would enable the program to process tree like structures (Srivastava 4:10 – 15).

Regarding claim 5, a method as recited in claim 4, wherein nested loops are represented in the loop tree as child nodes (Geva, 8:1 – 10, see code).

Regarding claim 6, a method as recited in claim 5 wherein parallel loops are represented in the loop as nodes level of the loop tree (Geva, 8:24, see parallelism).

Regarding claim 14, the system version of claim 5, see rationale as previously discussed above.

Regarding claim 15, the system version of claim 6, see rationale as previously discussed above.

Response to Arguments

7. Applicant's arguments with respect to claims 1 – 20 have been considered but are moot in view of the new ground(s) of rejection.


Correspondence

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chuck Kendall whose telephone number is 703-3086608. The examiner can normally be reached on 10:00 am - 6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Dam can be reached on 703-3054552. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CK


WEI Y. ZHEN
PRIMARY EXAMINER

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